

REMARKS

The amendment to Claim 9 above serves only to further define the various types of auxiliary agents and additives which are within the scope of component f) in the presently claimed invention. Support for this amendment can be found in the specification on page 5, line 26 through page 6, line 23. Applicants respectfully submit that no new matter has been added by this amendment.

Claims 3-9 were rejected under 35 U.S.C. 112, second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants' regard as the invention.

The Examiner indicated that the term "consisting of" was inconsistent with the language "other known auxiliary agents and additives". Applicants respectfully submitted that this rejection is moot in view of the preceding amendment to Claim 9 wherein Applicants have now identified which types of auxiliary agents and additives are within the scope of the claimed invention.

Claims 3-9 were rejected under 35 U.S.C. 103(a) as being unpatentable over the Volkert reference (U.S. Patent 5,096,933).

The Volkert reference is directed to a process for the preparation of rigid polyurethane foams having a low thermal conductivity. This process comprises reacting a) organic and/or modified organic polyisocyanates, with b) at least one higher molecular weight compound having at least two reactive hydrogen atoms, and optionally, c) lower molecular weight chain extending agents and/or crosslinking agents in the presence of d) cyclopentane, or mixtures comprising cyclopentane and/or cyclohexane, or at least one compound homogeneously miscible with cyclopentane and/or cyclohexane, which preferably has a boiling point below 35°C, and optionally, in combination with water, as well as in the presence of e) catalysts, and f) auxiliary agents and additives.

Applicants respectfully submit that the presently claimed invention is not rendered obvious by the Volkert reference (U.S. Patent 5,096,933).

One of ordinary skill in the art would not expect to be able to prepare dimensionally stable, flame-resistant polyurethane rigid foams that exhibit no surface brittleness upon reading the Volkert reference. The disclosure of this reference is broad in terms of the suitable blowing agents that are described. The suitable blowing agents include those compounds which are disclosed at column 8, line 42 through column 9, line 40.

Suitable blowing agents disclosed by this reference include cyclopentane; and mixtures of (1) cyclopentane, cyclohexane or a mixture thereof, and (2) at least one low boiling point compound homogeneously miscible with cyclopentane and/or cyclopentane, that preferably has a boiling point below 35°C. See column 8, lines 42-50. The Volkert reference further discloses that these blowing agents can be used alone or preferably in conjunction with water (see column 8, line 67 through column 9, line 1). It is readily apparent to one of ordinary skill in the art that the preferred blowing agents are a combination of cyclopentane and water; a combination of cyclopentane and/or cyclohexane, and water; a combination of cyclopentane and/or cyclohexane, water, and one or more low boiling alkanes (see column 9, lines 2-8). This reference further describes specific blends in terms of parts by weight at column 9, lines 21-40 as determined by the boiling point of the mixture and desired low thermal conductivity of the rigid PU foams to be formed.

The presently claimed process, by comparison, clearly excludes the presence of other blowing agents including water and low boiling compounds. The presently claimed invention is clearly limited to one or more C₁ to C₆ hydrocarbons as the blowing agent.

It is respectfully submitted that although the Volkert reference broadly discloses that the blowing agent may be only cyclopentane, cyclohexane or a mixture thereof, the working examples always use at least water (3.6 pbw) and cyclopentane (10.9 pbw) (see Example 1). Examples 2-5 all require a low boiling component. Of these four (4) examples, Example 4 is the only one that uses a "low boiling component" which would fall within the scope of a C₁ to C₆ hydrocarbon as required by Applicants' claims. However, this example also requires 3.0 pbw of water. As discussed above, water is clearly excluded from the presently claimed process. Furthermore, water is known to result in surface brittleness of foams due to the reaction between the isocyanate and the water in which carbon dioxide is eliminated. Thus, the foams of Examples 1 and 4 in the Volkert reference would clearly exhibit surface brittleness.

The remaining Examples (i.e. Examples 2, 3 and 5) use a low boiling compound as well as water and cyclopentane. In these Examples, the amount of water varies from 1.8 pbw (Example 5) to 3.5 pbw (Example 3), and the quantity of other blowing agent component or mixture thereof varies from 12 pbw (Example 3) to 16 pbw (Example 5). Examples 2 and 5 use partially fluorinated hydrocarbons, and Example 3 uses an ether, specifically diethylether. The foam formed in Example 3 would also be expected to exhibit surface brittleness due to elimination of carbon dioxide from the isocyanate-water reaction. The remaining foams (i.e. those formed in Examples 2 and 5) were prepared with a partially fluorinated hydrocarbon. Thus, these examples are irrelevant to the patentability of the presently claimed invention.

Applicants respectfully submit that the Volkert reference does not provide sufficient guidance to one of ordinary skill in the art such that one could reasonably expect to produce a rigid foam that is flame resistant and dimensionally stable while being free of surface brittleness from the presently required combination of components at the presently required isocyanate index. One of ordinary skill in the art would simply not expect that the presently required combination of components

which includes one or more C₁ to C₆ hydrocarbons as the sole blowing agent, when reacted at an isocyanate index of 200 to 600 would result in flame resistant, dimensionally stable rigid foams that are free of surface brittleness.

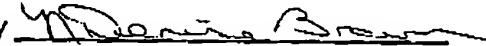
In support of this position, Applicants' direct the Examiner's attention to the declaration of Dr. Freiderichs, submitted herewith. The examples of this declaration clearly support Applicants' position that one of ordinary skill in the art has no insight into the presently claimed invention upon reading the Volkert reference. It is readily apparent to the skilled artisan from these examples that simply omitting water from the systems of the Volkert reference, either alone or in combination with increasing the Isocyanate Index, does not result in foams which are flame resistant, dimensionally stable and free of surface brittleness.

The presently required combination of components is necessary to produce flame resistant, dimensionally stable foams which are free of surface brittleness. One of ordinary skill in the art has no insight into the effect of the presently required combination of components upon reading the Volkert et al reference. Only after reading Applicants' specification does this become apparent. Such a perspective does not, however, provide a proper basis for a rejection under 35 U.S.C. § 103. Accordingly, it is respectfully submitted that this reference does not render the presently claimed invention obvious.

Attached hereto is a marked-up version of the changes made to the specification and claims by the present amendment. The attached page is captioned "**Version with markings to show changes made.**"

In view of the above amendments and remarks, Applicants respectfully submit that each of these rejections is in error. Applicants respectfully request the allowance of Claims 3-9.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE:IN THE CLAIMS:

Please amend Claim 9 as follows.

9. (Three Times Amended) A process for the production of rigid foams containing urethane groups and predominately isocyanurate groups consisting of reacting:

1) polyisocyanates;

with

2) from 30 to 90 parts by weight of compounds containing at least two isocyanate-reactive hydrogen atoms, having molecular weights of 400 to 10,000, and containing branched chains;

in the presence of

3) one or more C₁ to C₆ hydrocarbons as the sole blowing agents;

4) from 10 to 60 parts by weight of flameproofing agents;

and

5) from 10 to 20 parts by weight of compounds containing at least two isocyanate-reactive hydrogen atoms and having molecular weights of 32 to 399 as crosslinking agents;

and, optionally,

6) [other known] auxiliary agents and additives which are selected from the group consisting of emulsifiers, foam stabilizers, catalysts, reaction retarders, cell regulators, pigments, dyes, stabilizers against ageing and weathering, plasticizers, fungistatic agents, bacteriostatic agents and fillers;

wherein the parts by weight of components (2), (4) and (5) totals 100 parts by weight, and wherein the reaction is conducted at an isocyanate index of 200 to 600.